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U. S. DEPARTMENT OF AGRICULTURE.
BUREAU OF ENTOMOLOGY.

THE SO-CALLED COTTON FLEA.

BY W. D. HUNTER, BUREAU OF ENTOMOLOGY.
U. S. DEPARTMENT OF AGRICULTURE.

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In the last few years a new form of injury to cotton has appeared. It occurs especially in the coast counties of Texas but during the last two years it appeared in various localities in the state as far north as the Red River. What appears to be the same disorder appeared in the eastern states during the past season.

The trouble is manifested by the shedding of the very small squares and great changes in the growth of the plants. They become abnormally tall, have few or no branches and little or no fruit.

The disorder is a very important one. It has caused more loss of cotton in some of the coast counties during the past two years than the boll weevil. Numerous fields have been observed in which there was an average of not more than one boll to the plant. Of course, this amounted to a practically completed destruction of the crop.

The disorder is generally attributed by the farmers to a small insect called the cotton flea. During the past season an investigation was undertaken to determine whether the insect is the cause of the trouble and if so what means could be taken to control it. The experiments were conducted largely in Calhoun County. A number of large cages were placed over cotton plants to exclude the flea, which is more properly called the cotton hopper. In the cases where the insects were entirely excluded there was no shedding of the squares and the plants grew normally except for such peculiarities as all caged plants show. These cages were in fields where practically all of the cotton showed excessive shedding and the other indications of what has come to be known locally as "flea cotton". Other experiments consisted of treating small plats in fields of considerable size with insecticides. Certain of these plots, where preparations known to be effective against insects related to the hopper were used, showed considerably less shedding and more normal growth than untreated plots. These experiments are not absolutely conclusive. They need to be repeated and extended. This work will be done during the coming season under a special appropriation which has just been provided by Congress. In the meantime it is safe to say that the work indicates very strongly, if it does not prove, that the prevalent idea of the farmers that the hopper causes the trouble is correct.

The actual damage done to the cotton plant seems to be not altogether from the punctures made by the insects but by their injecting a virus of some kind. Plants from which all of the squares were removed as soon as they formed showed some abnormalities in growth but not the suppression of branches and other characteristics accompanying the disorder. Apparently the malady belongs to the large but little known group of mosaic diseases of plants. There are such diseases attacking sugar cane, tobacco, sugar beets and many other crop plants in this and other countries. In many cases insects more or less related to the cotton hopper have been found to be the agents in transmitting the virus exactly as mosquitoes transmit malaria, yellow fever and other diseases of human beings. The control of such diseases lies largely, if not altogether, in the destruction of the insects which transmit them. Consequently, considerable attention has been given to the testing of insecticides against the cotton hopper. Out of a long list of substances tried it was found that ordinary commercial flowers of sulphur is by far the most effective. This is fortunate since sulphur is available in large quantities and is cheap and easily applied. Even in very large quantities it has no injurious effect on the cotton plant.

The cotton hopper first appears in the spring on the roadside weed known as horsemint. This plant is probably the source of the virus. In south Texas about the end of April, under normal conditions, the hoppers migrate to cotton where they remain into the month of July when they migrate to the goat weed.

U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY

THE COTTON-LEAF MINER
BY W. D. BURRILL, BUREAU OF ENTOMOLOGY,
U. S. DEPARTMENT OF AGRICULTURE.

In the last few years a new form of injury to cotton has appeared. It occurs especially in the great cotton areas of Texas and during the last two years it appeared in various localities in the state as far north as the Red River. What appears to be the same disorder appeared in the eastern states during the past season.

The trouble is manifested in the shedding of the very small squares and great changes in the growth of the plants. They become extremely tall, have few or no branches and little or no fruit.

The disorder is a very important one. It has caused more loss of cotton in some of the great cotton areas during the past season than the boll-worm. Farmers' fields have been observed in which there was an average of not more than one boll to the plant. Of course, this amounted to a practically complete destruction of the crop.

The disorder is generally attributed by the farmers to a small insect called the cotton-lice. During the past season an investigation was undertaken to determine whether the insect in the cause of the trouble and if so what means could be taken to control it. The experiments were conducted largely in California County. A number of small squares were placed over cotton plants to exclude the flies, which in the spring called the cotton-lice. In the cases where the insects were present, the plants were not growing as well as those where the insects were excluded. The plants were practically all of the same height and the plants grew normally except for such peculiarities as all balled plants. These cases were in fields where practically all of the cotton seemed excessive shedding and the other indications of loss had come to be known locally as "flea cotton". Other experiments consisted of treating small plants in fields of considerable size with insecticides. The plants of these fields where protection known to be effective against insects related to the hopper were used, showed considerably less shedding and more normal growth than untreated plants. These experiments are not absolutely conclusive. They need to be repeated and extended. This work will be done during the coming season under a special appropriation which has just been provided by Congress. In the meantime it is safe to say that the work indicates very strongly, if it has not proved, that the prevalent idea of the farmers that the hopper causes the trouble is correct.

The actual damage done to the cotton plant seems to be not altogether from the annoyance made by the insects but by their injecting a virus of some kind. Plants from which all of the squares were removed as soon as they formed showed some abnormality in growth but not the suppression of branches and other characteristics accompanying the disorder. Apparently the virus belongs to the large but little known group of so-called diseases of plants. These are such diseases attacking human beings, animals, crops and many other crop plants in this and other countries. In many cases the insects more or less related to the cotton hopper have been found to be the agents in transmitting the virus exactly as mosquitoes transmit malaria. Yellow fever and other diseases of human beings. The spread of such diseases has been largely, if not altogether, in the development of the insects which transmit them. Consequently, considerable attention has been given to the testing of insecticides against the cotton hopper. Out of a long list of substances tried it was found that ordinary commercial flycatchers of sulphur is by far the most effective. This is fortunate since sulphur is available in large quantities and is cheap and easily applied. Even in very large quantities it has no injurious effect on the cotton plant.

The cotton hopper first appears in the spring on the roadside weeds where it hibernates. This plant is probably the source of the virus. In early June about the end of April, when most of the cotton is in the bud stage, the insects begin to move from the weeds to the cotton plants. They begin to inject the virus into the cotton plants.

The means of control suggested by these experiments and observations is the use of flowers of sulphur on the cotton about the end of April or when observations show that the hoppers are beginning to appear on the cotton plants. Applications of sulphur in dust form at weekly intervals through May and June should give satisfactory protection to the cotton. In the absence of rains less frequent applications may suffice.

These suggestions are made at this time on account of the urgent demand for information regarding the results of the investigation. It should be understood that the work has been carried through only one season and that the details as to applications have not been worked out. It will be necessary for every farmer who may apply sulphur to use his judgment as to the details but it is hoped that during the coming season the best procedure will be determined.

The occurrence of the destructive disease in widespread localities during the last two years has caused some speculation as to whether a new and important obstacle to the production of cotton, like the boll weevil, has appeared. It is impossible to make any dogmatic statement on this subject. The peculiar damage has not been regular year after year in the coastal counties and in 1924 was much less than during the preceding year. The insect has always occurred throughout the cotton belt, even in states where injury was never reported until last year. The indications are that the damage may have been aggravated or in part caused by peculiar climatic conditions in recent years. The chances are that the trouble will subside more or less but there is no certainty that exactly the opposite may not take place.

Houston, Texas,
January 8, 1925.

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Houston, Texas,
January 6, 1925.